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US Patents Full-Text Database
 US Pre-Grant Publication Full-Text Database
 JPO Abstracts Database
 EPO Abstracts Database
 Derwent World Patents Index
 IBM Technical Disclosure Bulletins

Term:
Display: **Documents in Display Format:** **Starting with Number**
Generate: ☐ Hit List ☒ Hit Count ☐ Image

Search

Clear

Help

Logout

Interrupt

6212657

Main Menu

Show 8 Numbers

Edit 8 Numbers

Preferences

Search History**Today's Date:** 6/26/2001

<u>DB Name</u>	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u>
USPT	110 and (signal near8 ((disk or storage) near6 (access\$4 or writ\$4 or read\$4)))	59	<u>L11</u>
USPT	15 and ((fifo or buffer) with (gate or logic or circuit or "xor"))	415	<u>L10</u>
USPT	18 and (controller with gate)	31	<u>L9</u>
USPT	15 and (gate with (storage or disk))	263	<u>L8</u>
USPT	16 and (controller with gate)	67	<u>L7</u>
USPT	15 and (gate with (storage or drive or disk))	629	<u>L6</u>
USPT	(disk or drive) near8 strip\$4	14653	<u>L5</u>
USPT	13 and (IDE or ATA)	0	<u>L4</u>
USPT	12 and (controller with gate)	52	<u>L3</u>
USPT	11 and ((gate or logic) with (storage or drive or disk))	1362	<u>L2</u>
USPT	Strip\$4 near8 (gate or logic)	4977	<u>L1</u>

=> s RAID# or strip?

1909 RAID#
417795 STRIP?
L1 419022 RAID# OR STRIP?

=> s RAID# or strip? step

L2 (1909)RAID#
L3 (417795)STRIP?
L4 419022 RAID# OR STRIP?

=> s "exclusive-or" or XOR# STEP

L5 (73047)"EXCLUSIVE-OR"
("EXCLUSIVE")
L6 (7786)XOR#
L7 76001 "EXCLUSIVE-OR" OR XOR#

=> S L7 (P) L3

417795 STRIP?
L8 862 L7 (P) L3

=> S L2 AND L8

1909 RAID#
L9 148 L2 AND L8

L9 ANSWER 1 OF 148 USPATFULL
PI US 6253271 B1 20010626
TI Bridge for direct data storage device access

L9 ANSWER 2 OF 148 USPATFULL
PI US 6249842 B1 20010619
TI Apparatus and method for processing data in a **RAID** system

L9 ANSWER 3 OF 148 USPATFULL
PI US 2001002480 A1 20010531
TI METHOD AND APPARATUS FOR PROVIDING CENTRALIZED INTELLIGENT CACHE
BETWEEN
MULTIPLE DATA CONTROLLING ELEMENTS

L9 ANSWER 4 OF 148 USPATFULL
PI US 6233648 B1 20010515
TI Disk storage system and data update method used therefor

L9 ANSWER 5 OF 148 USPATFULL
PI US 6223301 B1 20010424
TI Fault tolerant memory

L9 ANSWER 6 OF 148 USPATFULL
PI US 6219800 B1 20010417
TI Fault-tolerant storage system

L9 ANSWER 7 OF 148 USPATFULL
PI US 6219752 B1 20010417
TI Disk storage data updating method and disk storage controller

L9 ANSWER 8 OF 148 USPATFULL
PI US 6219751 B1 20010417
TI Device level coordination of access operations among multiple
raid control units

L9 ANSWER 9 OF 148 USPATFULL
PI US 6212657 B1 20010403
TI System and process for delivering digital data on demand

L9 ANSWER 10 OF 148 USPATFULL
PI US 6178536 B1 20010123
TI Coding scheme for file backup and systems based thereon

L9 ANSWER 11 OF 148 USPATFULL
PI US 6161165 20001212
TI High performance data path with XOR on the fly

L9 ANSWER 12 OF 148 USPATFULL
PI US 6151659 20001121
TI Distributed **raid** storage system

L9 ANSWER 13 OF 148 USPATFULL
PI US 6151641 20001121
TI DMA controller of a **RAID** storage controller with integrated
XOR parity computation capability adapted to compute parity in parallel
with the transfer of data segments

L9 ANSWER 14 OF 148 USPATFULL

PI US 6148368 20001114
 TI Method for accelerating disk array write operations using segmented cache memory and data logging

L9 ANSWER 15 OF 148 USPATFULL
 PI US 6138125 20001024
 TI Block coding method and system for failure recovery in disk arrays

L9 ANSWER 16 OF 148 USPATFULL
 PI US 6118931 20000912
 TI Video data storage

L9 ANSWER 17 OF 148 USPATFULL
 PI US 6108812 20000822
 TI Target device XOR engine

L9 ANSWER 18 OF 148 USPATFULL
 PI US 6098128 20000801
 TI Universal storage management system

L9 ANSWER 19 OF 148 USPATFULL
 PI US 6092215 20000718
 TI System and method for reconstructing data in a storage array system

L9 ANSWER 20 OF 148 USPATFULL
 PI US 6073218 20000606
 TI Methods and apparatus for coordinating shared multiple **raid** controller access to common storage devices

L9 ANSWER 21 OF 148 USPATFULL
 PI US 6061732 20000509
 TI Data streaming system utilizing an asynchronous technique for retrieving data from a stream server

L9 ANSWER 22 OF 148 USPATFULL
 PI US 6058455 20000502
 TI **RAID** system having a selectable unattended mode of operation with conditional and hierarchical automatic re-configuration

L9 ANSWER 23 OF 148 USPATFULL
 PI US 6055354 20000425
 TI Data storage apparatus

L9 ANSWER 24 OF 148 USPATFULL
 PI US 6052759 20000418
 TI Method for organizing storage devices of unequal storage capacity and distributing data using different **raid** formats depending on size of rectangles containing sets of the storage devices

L9 ANSWER 25 OF 148 USPATFULL
 PI US 6044207 20000328
 TI Enhanced dual port I/O bus bridge

L9 ANSWER 26 OF 148 USPATFULL
 PI US 6041423 20000321
 TI Method and apparatus for using undo/redo logging to perform asynchronous updates of parity and data pages in a redundant array data storage environment

L9 ANSWER 27 OF 148 USPATFULL
 PI US 6012123 20000104
 TI External I/O controller system for an independent access parity disk array

L9 ANSWER 28 OF 148 USPATFULL
 PI US 6006308 19990221
 TI Removable library media system utilizing redundant data storage and error detection and correction

L9 ANSWER 29 OF 148 USPATFULL
 PI US 5996089 19991130
 TI Loosely coupled mass storage computer cluster

L9 ANSWER 30 OF 148 USPATFULL
 PI US 5996046 19991130
 WO 9618141 19960613
 TI Parity generation system for generating new parity using old data in temporary storage without accessing main disk storage of disk drive

L9 ANSWER 31 OF 148 USPATFULL
 PI US 5991861 19991123
 TI Method of enabling and disabling a data function in an integrated circuit

L9 ANSWER 32 OF 148 USPATFULL
 PI US 5974544 19991026
 TI Method and controller for defect tracking in a redundant array

L9 ANSWER 33 OF 148 USPATFULL
 PI US 5974530 19991026
 TI Integrated PCI buffer controller and XOR function circuit

L9 ANSWER 34 OF 148 USPATFULL
 PI US 5974503 19991026
 TI Storage and access of continuous media files indexed as lists of **raid** stripe sets associated with file names

L9 ANSWER 35 OF 148 USPATFULL
 PI US 5961652 19991005
 TI Read checking for drive rebuild

L9 ANSWER 36 OF 148 USPATFULL
 PI US 5960169 19990928
 TI Transformational **raid** for hierarchical storage management system

L9 ANSWER 37 OF 148 USPATFULL
 PI US 5959860 19990928
 TI Method and apparatus for operating an array of storage devices

L9 ANSWER 38 OF 148 USPATFULL
 PI US 5950230 19990907
 TI **RAID** array configuration synchronization at power on

L9 ANSWER 39 OF 148 USPATFULL
 PI US 5950225 19990907
 TI Fly-by XOR for generating parity for data gleaned from a bus

L9 ANSWER 40 OF 148 USPATFULL
 PI US 5948110 19990907
 TI Method for providing parity in a **raid** sub-system using non-volatile memory

L9 ANSWER 41 OF 148 USPATFULL
 PI US 5946707 19990831
 TI Interleaved burst XOR using a single memory pointer

L9 ANSWER 42 OF 148 USPATFULL

PI US 5941969 19990824
 TI Bridge for direct data storage device access

L9 ANSWER 43 OF 148 USPATFULL
 PI US 5937428 19990810
 TI Method for host-based I/O workload balancing on redundant array controllers

L9 ANSWER 44 OF 148 USPATFULL
 PI US 5931918 19990803
 TI Parallel I/O network file server architecture

L9 ANSWER 45 OF 148 USPATFULL
 PI US 5928327 19990727
 TI System and process for delivering digital data on demand

L9 ANSWER 46 OF 148 USPATFULL
 PI US 5911779 19990615
 TI Storage device array architecture with copyback cache

L9 ANSWER 47 OF 148 USPATFULL
 PI US 5896493 19990420
 TI **Raid** algorithm using a multimedia functional unit

L9 ANSWER 48 OF 148 USPATFULL
 PI US 5893138 19990406
 TI System and method for improving channel hardware performance for an array controller

L9 ANSWER 49 OF 148 USPATFULL
 PI US 5889934 19990330
 TI Data validation system for a group of data storage disks

L9 ANSWER 50 OF 148 USPATFULL
 PI US 5884098 19990316
 TI **RAID** controller system utilizing front end and back end caching systems including communication path connecting two caching systems and synchronizing allocation of blocks in caching systems

L9 ANSWER 51 OF 148 USPATFULL
 PI US 5881250 19990309
 TI Host adapter system including an integrated PCI buffer controller and XOR function circuit

L9 ANSWER 52 OF 148 USPATFULL
 PI US 5875456 19990223
 TI Storage device array and methods for striping and unstriping data and for adding and removing disks online to/from a **raid** storage array

L9 ANSWER 53 OF 148 USPATFULL
 PI US 5867732 19990202
 TI Hardware method for verifying that an area of memory has only zero values

L9 ANSWER 54 OF 148 USPATFULL
 PI US 5864655 19990126
 TI Managing removable media in **raid** and rail environments

L9 ANSWER 55 OF 148 USPATFULL
 PI US 5862403 19990119
 TI Continuous data server apparatus and data transfer scheme enabling multiple simultaneous data accesses

L9 ANSWER 56 OF 148 USPATFULL

PI US 5862312 19990119
TI Loosely coupled mass storage computer cluster

L9 ANSWER 57 OF 148 USPATFULL
PI US 5860090 19990112
TI Append-only storage in a disk array using striping and parity caching

L9 ANSWER 58 OF 148 USPATFULL
PI US 5856989 19990105
TI Method and apparatus for parity block generation

L9 ANSWER 59 OF 148 USPATFULL
PI US 5832523 19981103
TI Archiving device and data file server using data file recorded in division over recording media

L9 ANSWER 60 OF 148 USPATFULL
PI US 5832198 19981103
TI Multiple disk drive array with plural parity groups

L9 ANSWER 61 OF 148 USPATFULL
PI US 5831393 19981103
TI Flexible parity generation circuit

L9 ANSWER 62 OF 148 USPATFULL
PI US 5826001 19981020
TI Reconstructing data blocks in a **raid** array data storage system having storage device metadata and **raid** set metadata

L9 ANSWER 63 OF 148 USPATFULL
PI US 5822584 19981013
TI User selectable priority for disk array background operations

L9 ANSWER 64 OF 148 USPATFULL
PI US 5812753 19980922
TI Method for initializing or reconstructing data consistency within an array of storage elements

L9 ANSWER 65 OF 148 USPATFULL
PI US 5805788 19980908
TI **Raid-5** parity generation and data reconstruction

L9 ANSWER 66 OF 148 USPATFULL
PI US 5802366 19980901
TI Parallel I/O network file server architecture

L9 ANSWER 67 OF 148 USPATFULL
PI US 5799324 19980825
TI System and method for management of persistent data in a log-structured disk array

L9 ANSWER 68 OF 148 USPATFULL
PI US 5787459 19980728
TI Distributed disk array architecture

L9 ANSWER 69 OF 148 USPATFULL
PI US 5774641 19980630
TI Computer storage drive array with command initiation at respective drives

L9 ANSWER 70 OF 148 USPATFULL
PI US 5768535 19980616
TI Software-based encoder for a software-implemented end-to-end scalable video delivery system

L9 ANSWER 71 OF 148 USPATFULL
 PI US 5745671 19980428
 TI Data storage system with localized XOR function

L9 ANSWER 72 OF 148 USPATFULL
 PI US 5742892 19980421
 TI Decoder for a software-implemented end-to-end scalable video delivery system

L9 ANSWER 73 OF 148 USPATFULL
 PI US 5742752 19980421
 TI Method for performing a **RAID stripe** write operation using a drive **XOR** command set

L9 ANSWER 74 OF 148 USPATFULL
 PI US 5740465 19980414
 TI Array disk controller for grouping host commands into a single virtual host command

L9 ANSWER 75 OF 148 USPATFULL
 PI US 5737744 19980407
 TI Disk array controller for performing exclusive or operations

L9 ANSWER 76 OF 148 USPATFULL
 PI US 5737741 19980407
 TI Disk array with parity data storage on the radially inner part of each disk

L9 ANSWER 77 OF 148 USPATFULL
 PI US 5720025 19980217
 TI Frequently-redundant array of independent disks

L9 ANSWER 78 OF 148 USPATFULL
 PI US 5708668 19980113
 TI Method and apparatus for operating an array of storage devices

L9 ANSWER 79 OF 148 USPATFULL
 PI US 5696934 19971209
 TI Method of utilizing storage disks of differing capacity in a single storage volume in a hierarchial disk array

L9 ANSWER 80 OF 148 USPATFULL
 PI US 5689678 19971118
 TI Distributed storage array system having a plurality of modular control units

L9 ANSWER 81 OF 148 USPATFULL
 PI US 5675726 19971007
 TI Flexible parity generation circuit

L9 ANSWER 82 OF 148 USPATFULL
 PI US 5666512 19970909
 TI Disk array having hot spare resources and methods for using hot spare resources to store user data

L9 ANSWER 83 OF 148 USPATFULL
 PI US 5664187 19970902
 TI Method and system for selecting data for migration in a hierarchic data storage system using frequency distribution tables

L9 ANSWER 84 OF 148 USPATFULL
 PI US 5659704 19970819
 TI Methods and system for reserving storage space for data migration in a redundant hierarchic data storage system by dynamically computing maximum storage space for mirror redundancy

L9 ANSWER 85 OF 148 USPATFULL
 PI US 5657468 19970812
 TI Method and apparatus for improving performance in a redundant array of independent disks

L9 ANSWER 86 OF 148 USPATFULL
 PI US 5651133 19970722
 TI Methods for avoiding over-commitment of virtual capacity in a redundant hierarchic data storage system

L9 ANSWER 87 OF 148 USPATFULL
 PI US 5649093 19970715
 TI Server disk error recovery system

L9 ANSWER 88 OF 148 USPATFULL
 PI US 5604902 19970218
 TI Hole plugging garbage collection for a data storage system

L9 ANSWER 89 OF 148 USPATFULL
 PI US 5623595 19970422
 TI Method and apparatus for transparent, real time reconstruction of corrupted data in a redundant array data storage system

L9 ANSWER 90 OF 148 USPATFULL
 PI US 5621660 19970415
 TI Software-based encoder for a software-implemented end-to-end scalable video delivery system

L9 ANSWER 91 OF 148 USPATFULL
 PI US 5619723 19970408
 TI System for scheduling read ahead operations if new request is sequential
 of last n last read requests wherein n is different on independent activities

L9 ANSWER 92 OF 148 USPATFULL
 PI US 5619690 19970408
 TI Computer system including a computer which requests an access to a logical address in a secondary storage system with specification of a local address in the secondary storage system

L9 ANSWER 93 OF 148 USPATFULL
 PI US 5617530 19970401
 TI Storage device array architecture with copyback cache

L9 ANSWER 94 OF 148 USPATFULL
 PI US 5615352 19970325
 TI Methods for adding storage disks to a hierarchic disk array while maintaining data availability

L9 ANSWER 95 OF 148 USPATFULL
 PI US 5613059 19970318
 TI On-line restoration of redundancy information in a redundant array system

L9 ANSWER 96 OF 148 USPATFULL
 PI US 5598549 19970128
 TI Array storage system for returning an I/O complete signal to a virtual I/O daemon that is separated from software array driver and physical device driver

L9 ANSWER 97 OF 148 USPATFULL
 PI US 5574882 19961112
 TI System and method for identifying inconsistent parity in an array of

storage

L9 ANSWER 98 OF 148 USPATFULL
PI US 5574855 19961112
TI Method and apparatus for testing raid systems

L9 ANSWER 99 OF 148 USPATFULL
PI US 5574851 19961112
TI Method for performing on-line reconfiguration of a disk array
concurrent
with execution of disk I/O operations

L9 ANSWER 100 OF 148 USPATFULL
PI US 5572661 19961105
TI Methods and system for detecting data loss in a hierarchic data storage
system

L9 ANSWER 101 OF 148 USPATFULL
PI US 5568629 19961022
TI Method for partitioning disk drives within a physical disk array and
selectively assigning disk drive partitions into a logical disk array

L9 ANSWER 102 OF 148 USPATFULL
PI US 5551002 19960827
TI System for controlling a write cache and merging adjacent data blocks
for write operations

L9 ANSWER 103 OF 148 USPATFULL
PI US 5548711 19960820
TI Method and apparatus for fault tolerant fast writes through buffer
dumping

L9 ANSWER 104 OF 148 USPATFULL
PI US 5546558 19960813
TI Memory system with hierarchic disk array and memory map store for
persistent storage of virtual mapping information

L9 ANSWER 105 OF 148 USPATFULL
PI US 5542065 19960730
TI Methods for using non-contiguously reserved storage space for data
migration in a redundant hierarchic data storage system

L9 ANSWER 106 OF 148 USPATFULL
PI US 5537567 19960716
TI Parity block configuration in an array of storage devices

L9 ANSWER 107 OF 148 USPATFULL
PI US 5537534 19960716
TI Disk array having redundant storage and methods for incrementally
generating redundancy as data is written to the disk array

L9 ANSWER 108 OF 148 USPATFULL
PI US 5530960 19960625
TI Disk drive controller accepting first commands for accessing composite
drives and second commands for individual diagnostic drive control
wherein commands are transparent to each other

L9 ANSWER 109 OF 148 USPATFULL
PI US 5530948 19960625
TI System and method for command queuing on raid levels 4 and 5
parity drives

L9 ANSWER 110 OF 148 USPATFULL
PI US 5526482 19960611
TI Storage device array architecture with copyback cache

L9 ANSWER 111 OF 148 USPATFULL
 PI US 5524204 19960504
 TI Method and apparatus for dynamically expanding a redundant array of
 disk drives

L9 ANSWER 112 OF 148 USPATFULL
 PI US 5522032 19960528
 TI Raid level 5 with free blocks parity cache

L9 ANSWER 113 OF 148 USPATFULL
 PI US 5522031 19960528
 TI Method and apparatus for the on-line restoration of a disk in a
 RAID-4 or RAID-5 array with concurrent access by
 applications

L9 ANSWER 114 OF 148 USPATFULL
 PI US 5519849 19960521
 TI Method of reducing the complexity of an I/O request to a RAID
 -4 or RAID-5 array

L9 ANSWER 115 OF 148 USPATFULL
 PI US 5506977 19960409
 TI Method and controller for minimizing reads during partial stripe write
 operations to a disk drive

L9 ANSWER 116 OF 148 USPATFULL
 PI US 5502836 19960326
 TI Method for disk restriping during system operation

L9 ANSWER 117 OF 148 USPATFULL
 PI US 5499253 19960312
 TI System and method for calculating RAID 6 check codes

L9 ANSWER 118 OF 148 USPATFULL
 PI US 5497457 19960305
 TI Redundant arrays of independent libraries of dismountable media with
 parity logging

L9 ANSWER 119 OF 148 USPATFULL
 PI US 5487160 19960123
 TI Concurrent image backup for disk storage system

L9 ANSWER 120 OF 148 USPATFULL
 PI US 5483641 19960109
 TI System for scheduling readahead operations if new request is within a
 proximity of N last read requests wherein N is dependent on independent
 activities

L9 ANSWER 121 OF 148 USPATFULL
 PI US 5473761 19951205
 TI Controller for receiving transfer requests for noncontiguous sectors
 and
 reading those sectors as a continuous block by interspersing no
 operation requests between transfer requests

L9 ANSWER 122 OF 148 USPATFULL
 PI US 5469566 19951121
 TI Flexible parity generation circuit for intermittently generating a
 parity for a plurality of data channels in a redundant array of storage
 units

L9 ANSWER 123 OF 148 USPATFULL
 PI US 5469548 19951121

TI Disk array controller having internal protocol for sending address/transfer count information during first/second load cycles and transferring data after receiving an acknowledgment

L9 ANSWER 124 OF 148 USPATFULL
PI US 5452444 19950919
TI Data processing system using flight availability disk arrays for handling power failure conditions during operation of the system

L9 ANSWER 125 OF 148 USPATFULL
PI US 5448709 19950905
TI Disk array controller having command descriptor blocks utilized by bus master and bus slave for respectively performing data transfer operations

L9 ANSWER 126 OF 148 USPATFULL
PI US 5446855 19950829
TI System and method for disk array data transfer

L9 ANSWER 127 OF 148 USPATFULL
PI US 5442752 19950815
TI Data storage method for DASD arrays using striping based on file length

L9 ANSWER 128 OF 148 USPATFULL
PI US 5418925 19950523
TI Fast write I/O handling in a disk array using spare drive for buffering

L9 ANSWER 129 OF 148 USPATFULL
PI US 5412668 19950502
TI Parity striping feature for optical disks

L9 ANSWER 130 OF 148 USPATFULL
PI US 5408644 19950418
TI Method and apparatus for improving the performance of partial stripe operations in a disk array subsystem

L9 ANSWER 131 OF 148 USPATFULL
PI US 5392244 19950221
TI Memory systems with data storage redundancy management

L9 ANSWER 132 OF 148 USPATFULL
PI US 5390327 19950214
TI Method for on-line reorganization of the data on a RAID-4 or RAID-5 array in the absence of one disk and the on-line restoration of a replacement disk

L9 ANSWER 133 OF 148 USPATFULL
PI US 5390187 19950214
TI On-line reconstruction of a failed redundant array system

L9 ANSWER 134 OF 148 USPATFULL
PI US 5379417 19950103
TI System and method for ensuring write data integrity in a redundant array data storage system

L9 ANSWER 135 OF 148 USPATFULL
PI US 5359611 19941025
TI Method and apparatus for reducing partial write latency in redundant disk arrays

L9 ANSWER 136 OF 148 USPATFULL
PI US 5355453 19941011
TI Parallel I/O network file server architecture

L9 ANSWER 137 OF 148 USPATFULL
PI US 5341381 19930323
TI Redundant array parity caching system

L9 ANSWER 138 OF 148 USPATFULL
PI US 5315602 19940524
TI Optimized stripe detection for redundant arrays of disk drives

L9 ANSWER 139 OF 148 USPATFULL
PI US 5313626 19940517
TI Disk drive array with efficient background rebuilding

L9 ANSWER 140 OF 148 USPATFULL
PI US 5313585 19940517
TI Disk drive array with request fragmentation

L9 ANSWER 141 OF 148 USPATFULL
PI US 5309451 19940503
TI Data and parity prefetching for redundant arrays of disk drives

L9 ANSWER 142 OF 148 USPATFULL
PI US 5305326 19940419
TI High availability disk arrays

L9 ANSWER 143 OF 148 USPATFULL
PI US 5297258 19940322
TI Data logging for hard disk data storage systems

L9 ANSWER 144 OF 148 USPATFULL
PI US 5287462 19940215
TI Bufferless SCSI to SCSI data transfer scheme for disk array applications

L9 ANSWER 145 OF 148 USPATFULL
PI US 5274799 19931228
TI Storage device array architecture with copyback cache

L9 ANSWER 146 OF 148 USPATFULL
PI US 5235601 19930810
TI On-line restoration of redundancy information in a redundant array system

L9 ANSWER 147 OF 148 USPATFULL
PI US 5208813 19930504
TI On-line reconstruction of a failed redundant array system

L9 ANSWER 148 OF 148 USPATFULL
PI US 5163131 19921110
TI Parallel I/O network file server architecture